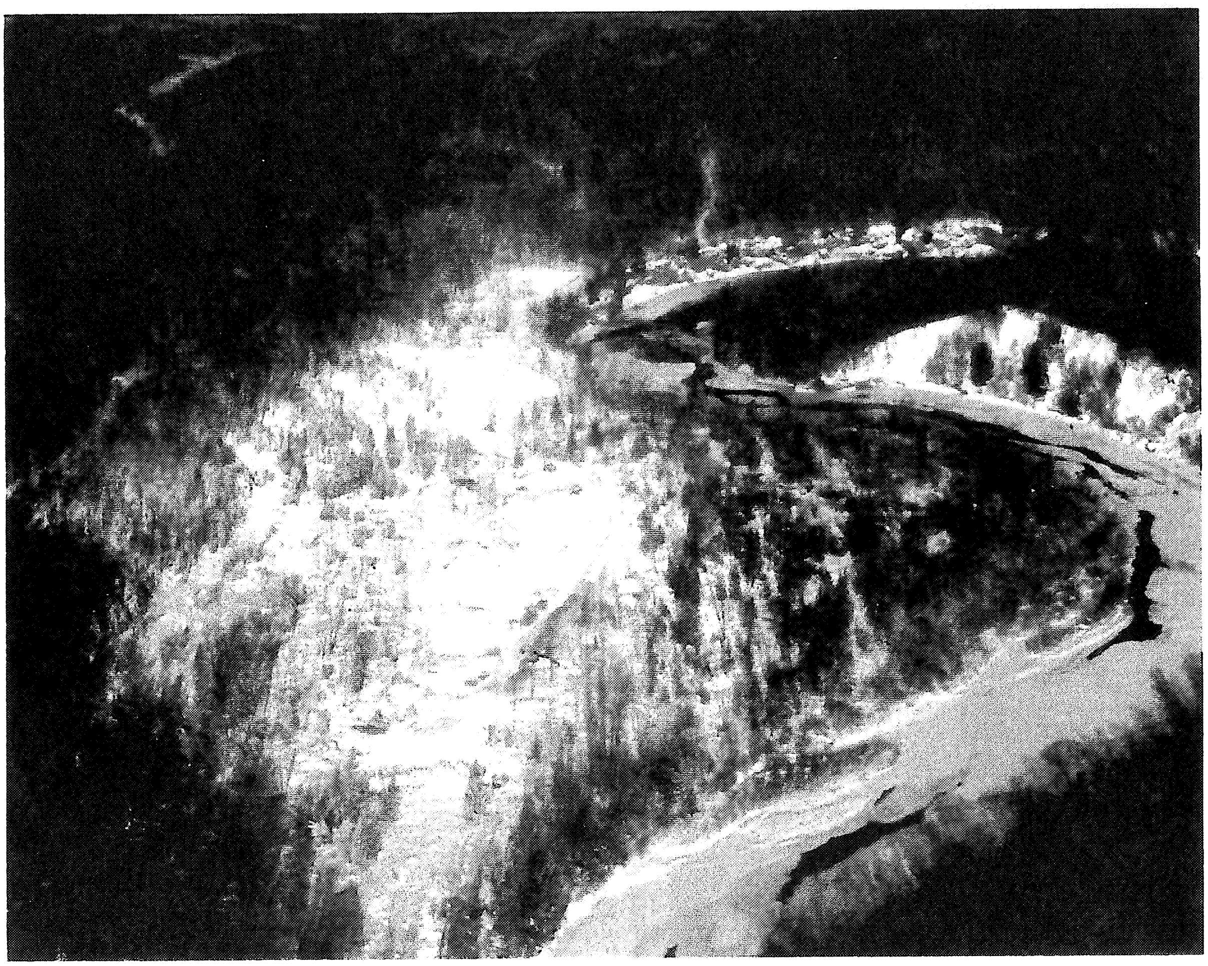
ATTACHMENT T

Clear-cut on private land on the Bad River Reservation
Air photo reproduction

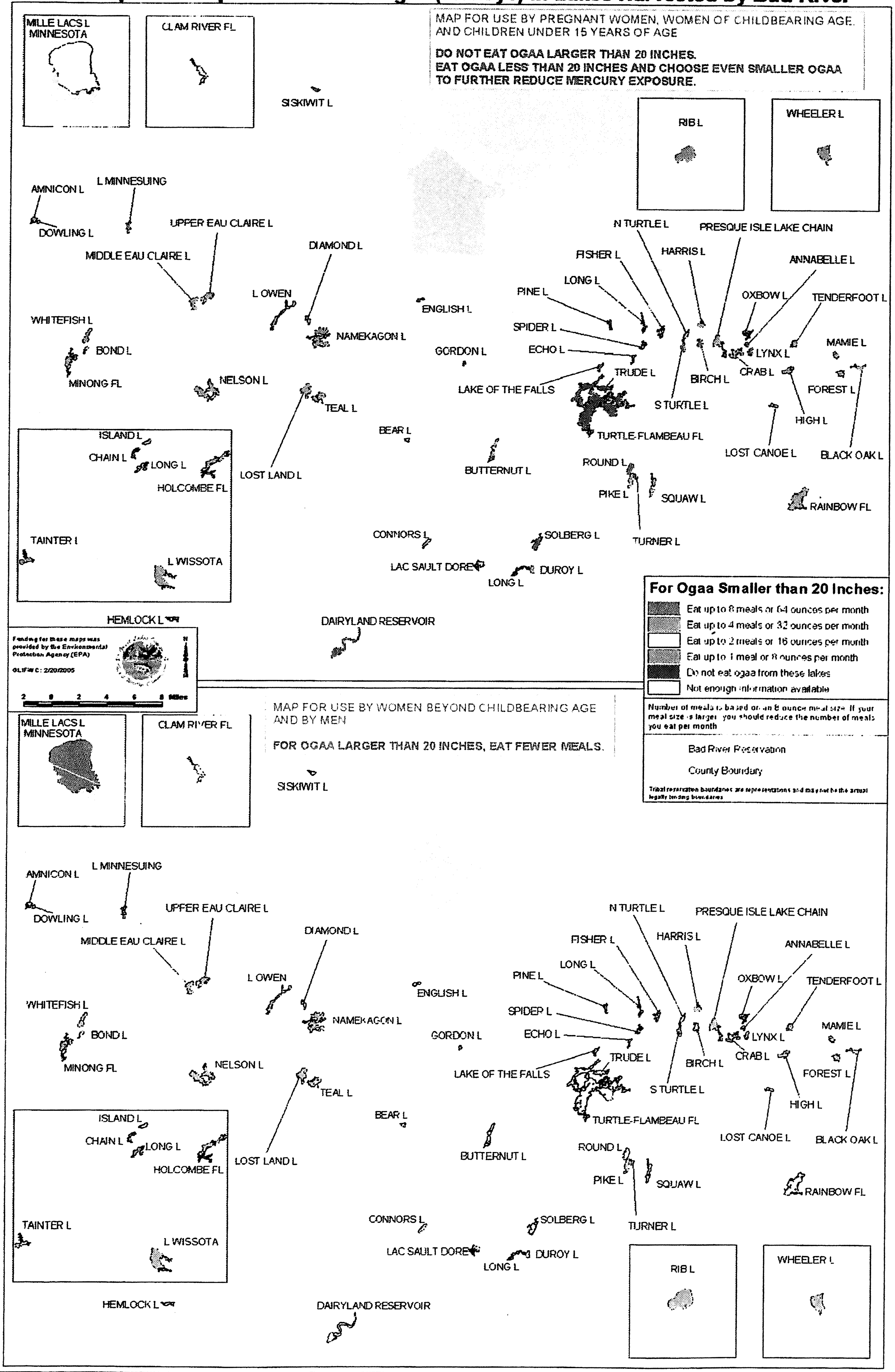
The river flows to the north. Just downstream of this site is the Bad River Falls, an area used by Tribal members for spearing fish in the spring. The Falls is also a sturgeon spawning area.



ATTACHMENT U

A Map to Help You Find Safe Walleye in Lakes Harvested by Bad River. Great Lakes Indian Fish and Wildlife Commission. 2005.

This Map is to Help You Find Safe Ogaa (Walleye) in Lakes Harvested by Bad River



Recommended Maximum Number of Ogaa Meals per Month For Lakes Harvested by Bad River

SORTING AND LABELING *OGAA* PRIOR TO FREEZING

When Cleaning *Ogaa*:

- Put *ogaa* under 20 inches in bags labeled "under 20 inches."
- Put *ogaa* over 20 inches in bags labeled "over 20 inches".
- Label bags with the lake name.
- Follow the advice below for maximum number of meals per month.

USING THIS CHART TO FIND SAFER *GIIGOONH*

MAXIMUM NUMBER OF MEALS PER MONTH

Advice is for all lakes combined. For example, if you eat four meals in a month from green lakes you should not eat any other meals of *ogaa* in that month.

MEAL SIZE

Meal size is based on 8 ounces. An average 19 inch *ogaa* will have 8 ounces of meat. If your meal size is larger you should eat fewer meals of *ogaa*. If it is smaller you can eat more meals of *ogaa*.

OTHER *GIIGOONH*

Giigoonh such as muskellunge, largemouth bass, smallmouth bass, and northern pike will have more mercury than *giigoonh* such as lake whitefish, herring, bluegill, sunfish, crappie or perch. Try to choose safer *giigoonh*.

		Women of childbearing age and children less than 15	Women beyond childbearing years and men 15 and older
LAKE	COUNTY	Maximum number of meals per month	Maximum number of meals per month
AMNICON L	DOUGLAS	1	2
ANNABELLE L	VILAS	0	2
BEAR L	ASHLAND	1	2
BIRCH L	VILAS	0	2
BLACK OAK L	VILAS	1	4
BOND L	DOUGLAS	1	4
BUTTERNUT L	PRICE	1	2
CHAIN L	RUSK	1	4
CLAM R FL	BURNETT	Not Enough Information	
CONNORS L	SAWYER	2	4
CRAB L	VILAS	1	2
DAIRYLAND RESERVOIR	RUSK	0	2
DIAMOND L	BAYFIELD	1	2
DOWLING L	DOUGLAS	0	2
DUROY L	PRICE	1	4
ECHO L	IRON	1	4
ENGLISH L	ASHLAND	0	2
FISHER L	IRON	Not Enough Information	
FOREST L	VILAS	1	4
GORDON L	ASHLAND	Not Enough Information	
HARRIS L	VILAS	1	4
HEMLOCK L	BARRON	Not Enough Information	
HIGH L	VILAS	1	4
HOLCOMBE FL	CHIPPEWA	1	4
ISLAND L	RUSK	Not Enough Information	
L MINNESUING	DOUGLAS	0	2
L OF THE FALLS	IRON	Not Enough Information	
L OWEN	BAYFIELD	1	4
L WISSOTA	CHIPPEWA	1	4
LAC SAULT DORE	PRICE	2	4
LONG L	IRON	0	2
LONG L	PRICE	1	4
LONG L	CHIPPEWA	2	8
LOST CANOE L	VILAS	Not Enough Information	
LOST LAND L	SAWYER	1	4
LYNX L	VILAS	0	2
MAMIE L	VILAS	1	4
MIDDLE EAU CLAIRE L	BAYFIELD	1	4
MILLE LACS L	MILLE LACS	2	8
MINONG FL	WASHBURN	1	4
N TURTLE L	VILAS	1	2
NAMEKAGON L	BAYFIELD	1	4
NELSON L	SAWYER	1	4
OXBOW L	VILAS	0	2
PIKE L	PRICE	1	4
PINE L	IRON	1	4
PRESQUE ISLE L CHAIN	VILAS	1	4
RAINBOW FL	ONEIDA	1	2
RIB L	TAYLOR	1	4
ROUND L	PRICE	0	2
S TURTLE L	VILAS	0	2
SISKIWIT L	BAYFIELD	0	2
SOLBERG L	PRICE	0	2
SPIDER L	IRON	Not Enough Information	
SQUAW L	VILAS	1	2
TAINTER L	DUNN	1	4
TEAL L	SAWYER	1	4
TENDERFOOT L	VILAS	1	4
TRUDE L	IRON	0	2
TURNER L	PRICE	1	4
TURTLE-FLAMBEAU FL	IRON	0	2
UPPER EAU CLAIRE L	BAYFIELD	1	4
WHEELER L	OCONTO	1	4
WHITEFISH L	DOUGLAS	1	4

For many native people, *giigoonh* are part of a traditional and healthy diet. If you rely on *giigoonh*, choose safer *giigoonh* with lower levels of mercury by following the advice on this map.

RISKS AND BENEFITS

Risk: Mercury can damage the nervous system, especially the brain. Fetuses and babies are the most at risk because their nervous systems are rapidly developing. Children exposed to unsafe levels while in the womb have been found to experience delayed development in walking and talking, even though the mother was not affected. Mercury cannot be removed by trimming or cooking.

Benefit: Eating even as few as two to three meals of *giigoonh* a month may reduce your risk of death due to heart disease.

If you have questions about finding safer ogaa, call GLIFWC at 1-800-250-7574.
To learn more about mercury in ogaa, visit GLIFWC's website at www.glifwc.org/bio/mercury.htm

ATTACHMENT V

Lake Superior Research Institute. 2004. Mercury Concentrations in Fish Captured in 2005 from the Bad River Reservation. University of Wisconsin – Superior. Superior, Wisconsin.

Mercury Concentrations in Fish Captured in 2005 from the Bad River Reservation

By

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December 9, 2005

Introduction

Four species of fish (walleye, *Stizostedion vitreum*; northern pike, *Esox lucius*; redhorse sucker, *Moxostoma* sp.; white sucker, *Catostomus commersoni*) were sampled from the Kakagon River, on the Bad River Reservation. The fish were delivered to the University of Wisconsin-Superior, Lake Superior Research Institue analytical laboratory on 18 July 2005 and kept frozen until processing for mercury analysis.

Methods

At the time fish were captured, a tribal warden or biologist was present to measure the total length, weight, and sex of each fish. The fish were tagged with a unique number (i.e., a fish identification number) and whole fish with chain-of-custody forms were transferred to the Bad River Tribal laboratory. The samples were immediately frozen. Fish were prepared for analysis by filleting, removing the skin from the fillet to be analyzed and placing the sample into a plastic bag along with an identification tag. Frozen fillets were transferred to the Lake Superior Research Institute laboratory with the accompanying chain-of-custody documentation. The samples were stored in a freezer at approximately -18 C until they were removed and thawed for processing and analysis of mercury and moisture content.

Before processing the fish tissues, all glassware, utensils, and grinders were cleaned according to the appropriate methods (SOP SA/8). Each day, the fish to be processed were removed from the freezer and allowed to warm to a flexible, but stiff, consistency. The skinless fillet was ground three times in a grinder. A small amount of the initial tissue that passed through the grinder was collected and discarded (SOP SA/10). A sub-sample of the ground tissue was placed into a clean glass vial and frozen until mercury analysis was conducted. The grinder was disassembled after each fillet was ground and the unit was washed according to the grinder cleaning procedure (SOP SA/8).

Fish tissues were weighed for mercury analysis following standard laboratory procedure (SOP SA/11). Mercury solutions for making tissue spikes and preparing analytical standards were prepared by the procedures in SOP SA/42. Mercury analyses were performed using cold vapor mercury analysis techniques on a Perkin Elmer FIMS 100 mercury analysis system (SOP SA/13). Mercury concentrations and quality assurance calculations were done in Microsoft Excel according to SOP SA/37. The biota method detection limit was 0.0113 μg Hg/g for a tissue mass of 0.2 g. The detection limit was determined using a tuna fish sample containing a low concentration of mercury (SOP SA/35).

Moisture content was determined in all of the tissues analyzed for mercury. Tissue moisture content was calculated using the wet and dried tissue weights (SOP NT/15). A portion (1 to 4 g) of ground tissue was placed into a pre-dried and pre-weighed aluminum pan immediately following tissue grinding, with the exception of walleye sample 1936 which was done at a later time. The pan and wet tissue were immediately weighed and placed into an oven (60°C) and dried for 24-48 hours. A final weighing was made on the pan containing the dried tissue sample.

Quality Assurance

Data quality was monitored by four methods: analysis of similar fish tissues (Commercial canned tuna; *Thunnus* sp.) before and after the tissue grinding process (procedural blanks) to measure laboratory bias; analysis of dogfish shark (DORM-2, *Squalus acanthias*) from the Canadian government (certified reference material from National Research Council Canada, Ottawa, Ontario, Canada) that has a certified concentration of mercury to measure analytical accuracy; duplicate analysis of fish tissue from the same fillet to measure analytical precision; and analysis of tissue with known additions of mercury to determine spike recovery and analytical interferences. Two sets of standard solutions with known amounts of mercury (analytical standards) were analyzed with the tissue samples. These analytical solutions contained 0, 50, 100, 500, 1000 and 6000 ng Hg/L. They were prepared from a purchased 1000 ± 10 ppm mercury (prepared from mercuric nitrate) reference standard solution (Fisher Scientific, Pittsburgh, PA). A summary table of the mercury calibration data is provided (Appendix A).

A commercial canned tuna fish (*Thunnus sp.*) sample was used as a measurement of laboratory bias on the grinding process for sample preparation. One aliquot from a can of tuna was transferred directly into a sample bottle after the liquid was squeezed out of the can. The second portion was ground in the same manner as the sample fish fillets. This check was made to ensure that no contamination or loss of mercury was occurring in the grinding process. Results were considered acceptable when the relative percent difference was <50 percent.

An acceptable range of mercury concentrations for the DORM-2 standard reference material was calculated for this study based upon the analyses conducted from 6/22/04 to 10/13/04 (mean ± 2 times the standard deviation of all DORM-2 analyses). The calculated acceptable range was 3.27 to 5.31 μg Hg/g.

Values for the duplicate analysis were acceptable when having a relative percent difference <24.1%. Prior to digestion, tissues from ten percent of the fish samples were spiked, in duplicate, with a known quantity of mercury and analyzed for recovery of the spiked mercury. Spike recovery was considered acceptable when it was in the range of 69.1 to 123 percent of the expected value. The acceptable ranges for relative percent difference of duplicates and spike recovery were based on the mean ± 2 times the standard deviation of all analyses of duplicate and spiked samples conducted from 6/22/04 to 10/13/04, respectively.

Results

Quality Assurance – Mercury analysis of the canned tuna fish processed as a procedural blank concurrent with the grinding of the samples for this project resulted in a relative percent difference of 13.9% between the before and after grinding mercury concentrations (Table 1). This was within the acceptance criteria.

Analysis of the dogfish shark tissue (DORM-2) standard reference material was conducted in duplicate with the samples (Table 2). The certified mercury concentration for the dogfish tissue was 4.64 ± 0.26 μg Hg/g. The mean and standard deviation of the analysis of the standard reference material was 96.5 ± 5.0 percent of the certified value. These analytical results were within the acceptance range for DORM-2 samples.

Three fish samples were analyzed in duplicate. Two portions of the same tissue were digested and analyzed independently. Relative percent differences between the two mercury analyses of the same tissue averaged 11.9 ± 1.2 percent (Table 3). The relative percent differences were all within the acceptance criteria.

Several tissue samples were spiked with known concentrations of mercury prior to digestion. Recovery for the three spiked samples averaged 102 ± 1.2 percent (Table 4). All analyses were within the acceptance range for spike recoveries.

Mercury Analysis – Skinless fillets of 12 walleye, 8 northern pike, 2 redhorse sucker, and 1 white sucker were analyzed for total mercury concentration. Total mercury concentrations on a wet weight basis (Table 5) ranged from 0.056 to 0.743 μg Hg/g (parts per million). Within the walleye and northern pike species, mercury concentration increased with total length of the fish (Figure 1). The regression lines displayed in Figure 1 indicate that the mercury concentration increases more rapidly in walleye than northern pike as the length of the fish increases. When comparing fish of similar length, walleye had higher mercury concentrations than did the northern pike or suckers.

Tissue Moisture Analysis – Percent moisture was measured in the muscle tissue samples immediately following grinding with the exception of one sample that was analyzed at a later date (Table 6). Fish muscle tissue moisture ranged from 76.9 to 81.9 percent moisture.

Table 1. Relative Percent Difference of Total Mercury for Procedural Blank Samples (Before and After Grinding) Processed Coincident with the Bad River Fish Analysis.

Date of Analysis	Grinding Date	Before Grinding µg Hg/g	After Grinding µg Hg/g	Mean µg Hg/g	Relative* Percent Difference
9/20/05	7/20/2005	0.386	0.336	0.361	13.9

* Relative percent difference is calculated by the equation $(|\text{before} - \text{after}|/\text{mean})100$

Table 2. Mercury Concentrations of Dogfish Tissue (Standard Reference Material DORM-2) Analyzed during Bad River Fish Analysis. The Tissue has a Certified Mercury Concentration of 4.64 ± 0.26 µg Hg/g Tissue.

Date of Analysis	Dorm 2-1 µg Hg/g	Percent of Expected Dorm 2-1	Dorm 2-2 µg Hg/g	Percent of Expected Dorm 2-2
9/20/05	4.65	100	4.31	92.9

Table 3. Relative Percent Difference of Duplicate Analyses for Total Mercury Content in Fillets of Three Species Analyzed Concurrent with the Bad River Fish Analysis Project.

Date of Analysis	Species	Tag Number	µg Hg/g	Duplicate µg Hg/g	Mean µg Hg/g	Relative Percent Difference
9/20/05	Northern Pike	2816	0.180	0.202	0.191	11.5
9/20/05	Walleye	2934	0.087	0.097	0.092	10.9
9/20/05	Redhorse Sucker	2950	0.077	0.088	0.083	13.3
				Mean ± Std. Dev.		11.9 ± 1.2

Table 4. Percent of Mercury Recovered from Fillet Samples of Three Fish Species Spiked with a Known Amount of Mercury.

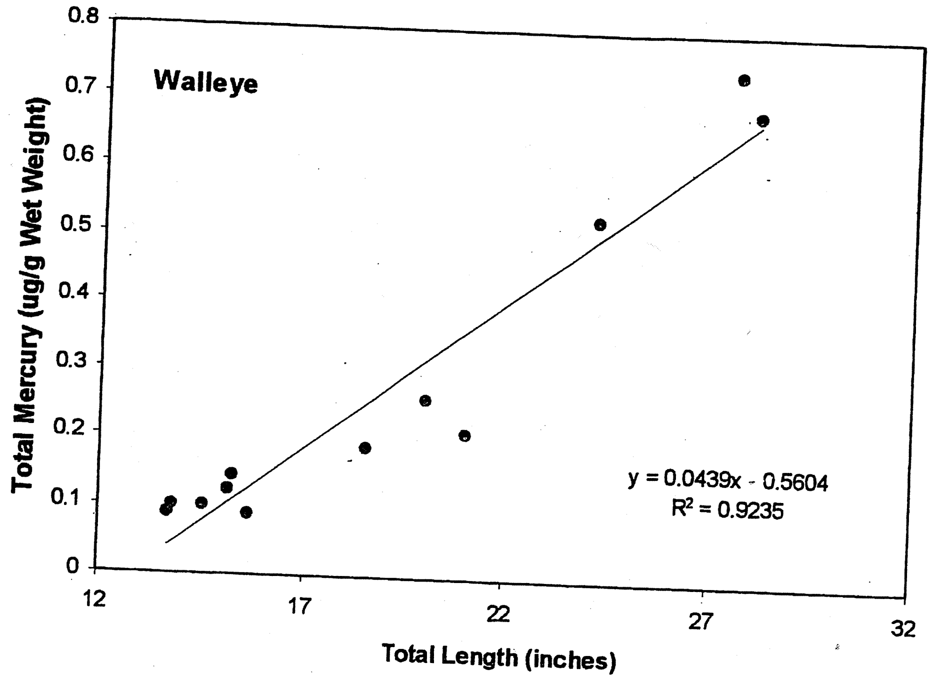
Date of Analysis	Species	Tag Number	Spike #1	Spike #2	Mean	Std. Dev.
9/20/05	Northern Pike	2816	102	99.2	101	2.0
9/20/05	Walleye	2934	101	101	101	0
9/20/05	Redhorse Sucker	2950	104	102	103	1.4
				Mean ± Std. Dev.		102 ± 1.2

Table 5. Total Mercury Concentration (Wet Weight) in Fish Fillets from Fish Captured in the Kakagon River during 2005 for the Bad River Fish Analysis Project.

Date of Analysis	Species	Tag Number	Length (inches)	Sex	µg Hg/g
9/20/2005	Northern Pike	2812	27.1	M	0.215
9/20/2005	Northern Pike	2813	25.5	F	0.226
9/20/2005	Northern Pike	2815	22.6	U	0.177
9/20/2005	Northern Pike	2816	20.4	F	0.180
9/20/2005	Northern Pike	2817	24.8	U	0.184
9/20/2005	Northern Pike	2818	26.9	F	0.266
9/20/2005	Northern Pike	2819	32.1	M	0.340
9/20/2005	Northern Pike	2820	31.4	F	0.260
9/20/2005	Redhorse Sucker	2945	24.5	F	0.225
9/20/2005	Redhorse Sucker	2950	19.4	F	0.077
9/20/2005	Walleye	2779	28.1	F	0.684
9/20/2005	Walleye	2780	24.2	F	0.528
9/20/2005	Walleye	2931	15.2	M	0.141
9/20/2005	Walleye	2932	15.6	M	0.086
9/20/2005	Walleye	2933	15.1	M	0.122
9/20/2005	Walleye	2934	13.7	M	0.087
9/20/2005	Walleye	2935	14.5	M	0.099
9/20/2005	Walleye	2936	13.8	M	0.100
9/20/2005	Walleye	2937	18.5	M	0.186
9/20/2005	Walleye	2938	20.0	U	0.258
9/20/2005	Walleye	2944	21.0	F	0.210
9/20/2005	Walleye	2948	27.6	F	0.743
9/20/2005	White Sucker	2949	16.6	U	0.056

Table 6. Percent Moisture in Fish Fillets from the Bad River Fish Analysis Project.

Species	Tag Number	Percent Moisture	Relative Percent Difference
Northern Pike	2812	78.1	0.1
Northern Pike	2812 DUP	78.2	
Northern Pike	2813	78.1	
Northern Pike	2815	78.3	
Northern Pike	2816	79.4	
Northern Pike	2817	79.2	
Northern Pike	2818	78.8	
Northern Pike	2819	76.9	
Northern Pike	2820	77.3	
Redhorse Sucker	2945	81.9	
Redhorse Sucker	2950	78.6	
Walleye	2779	78.2	0.3
Walleye	2779 DUP	78.0	
Walleye	2780	77.8	
Walleye	2931	77.7	
Walleye	2932	77.7	
Walleye	2933	77.6	
Walleye	2934	81.0	
Walleye	2935	77.2	
Walleye	2936	79.4	
Walleye	2937	78.0	
Walleye	2938	78.7	
Walleye	2944	81.2	
Walleye	2948	79.5	
White Sucker	2949	78.3	0.1
White Sucker	2949 DUP	78.2	
	Mean ± Std. Dev.	78.6 ± 1.2	



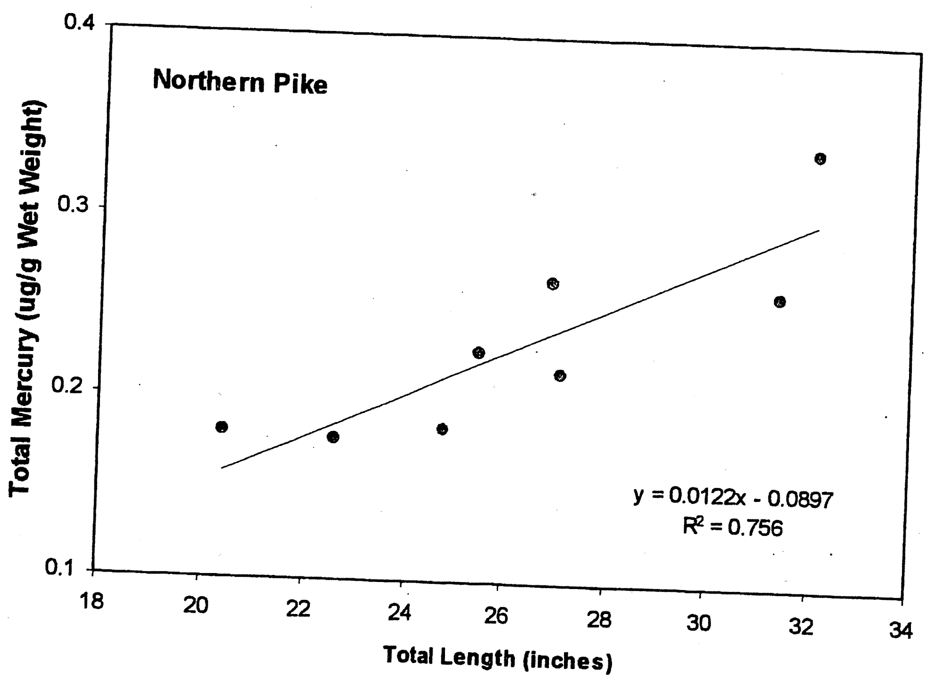


Figure 1. Total Mercury in Muscle Tissue of Walleye and Northern Pike from the Kakagon River.

APPENDIX A

Mercury Calibration Curve Data from the Bad River Fish Analysis Project.

Analysis Date	Standard Conc. ngHg/L	Blank Corrected Abs 1	Blank Corrected Abs 2	Blank Corrected Mean	Slope	Intercept	Correlation
9/20/2005	0	0.0010*	0.0012*	0			
9/20/2005	50	0.0011	0.001	0.0011			
9/20/2005	100	0.0022	0.0021	0.0022			
9/20/2005	500	0.0111	0.0109	0.0110			
9/20/2005	1000	0.0224	0.0216	0.0220			
9/20/2005	6000	0.1301	0.1246	0.1274	2.12E-05	0.0002	0.99998

* Absorbance values for 0 ng/L standards are actual absorbances measured. Zero is used as value for blank concentration in calculating the calibration curve.